

What is claimed is:

1. A surgical anastomosis apparatus comprising:

a mobile console housing a power supply, computer control means and manipulator means,

a plurality of self contained anastomosis appliance and applicator assemblies attachable to said manipulator means and actuated by said computer control means, whereby

said anastomosis appliance and applicator assemblies are capable of drawing together and securing two prepared blood vessels to form an anastomosis.

2. The surgical anastomosis apparatus of claim 1 wherein said mobile console comprises,

a transport cart containing said power supply and computer control means, and further containing an automated code scanner,

at least one tray holding a plurality of said anastomosis appliance and applicator assemblies over said automated code scanner,

a vertically extendable mast assembly extendable above said at least one tray,

a positioning arm extendable horizontally from said mast assembly and rotatable horizontally relative thereto,

a working arm connected to said positioning arm at an end remote from said mast assembly and rotatable and pivotable relative to said positioning arm, and

a manipulatable wand connected to said working arm remote from said positioning arm, said wand being rotatable and pivotable relative to said working arm and having an end adapted to removably receive said anastomosis appliance and applicator assemblies.

3. The surgical anastomosis apparatus of claim 2 further comprising communication means between said computer control means and said manipulatable wand whereby said computer control means regulates operation of actuators within said wand, which actuators, in turn, operate said appliance and applicator assemblies.

4. The surgical anastomosis apparatus of claim 3 further comprising a primary control panel on said cart providing communication with said computer control means.

5. The surgical anastomosis apparatus of claim 4 further comprising at least one secondary control panel attached to said positioning arm and providing communication with said computer control means.

6. The surgical anastomosis apparatus of claim 5 wherein said mast assembly comprises at least two telescoping sections capable of retracting into and extending upwards from said cart, and a drive mechanism adapted to extend and retract said mast assembly in response to commands entered at said primary or secondary control panels.

7. The surgical anastomosis apparatus of claim 6 further comprising a brake mechanism associated with said mast assembly and drive mechanism whereby said mast is positively retained in position when extended.

8. The surgical anastomosis apparatus of claim 7 wherein said at least one tray and said automated code scanner are attached to said mast assembly and are raised to an operational height when said mast assembly is extended.

9. The surgical anastomosis apparatus of claim 8 wherein said positioning arm comprises at least two relatively telescopable sections, a first section extending horizontally from the upper end of said mast assembly and connected thereto by a fitting whereby said positioning arm is rotatable about the longitudinal axis of said mast assembly, said fitting being lockable to maintain said positioning arm in a desired position, and a second section telescopable within said first section, said positioning arm having locking means to secure said second section relative to said first section.

10. The surgical anastomosis apparatus of claim 9 wherein said working arm comprises a first segment connected to the free end of said positioning arm by a two-degree of freedom rotating joint, and a second segment telescopably slidable within said first segment, wherein said first segment houses a counterbalance means attached to said second segment and adapted to automatically and dynamically balance said working arm and said manipulatable wand when said second segment is extended or telescoped during use, said second segment having a two-degree of freedom rotating joint at the distal end thereof, said joint having a receptacle with a quick connect fitting whereby said manipulatable wand is attached to said second segment.

11. The surgical anastomosis apparatus of claim 10 wherein said counterbalance means comprises a linear dynamic balance system comprising fixed and movable counterweights, said movable counterweights being part of a pulley system whereby said

movable counterweights respond to telescoping action of said second segment within said first segment to maintain said working arm and attached manipulatable wand in linear balance at any extension of said second segment.

12. The surgical anastomosis apparatus of claim 11 wherein said manipulatable wand comprises a functional unit housing two actuators, a mechanical transmission assembly, power supply and electronic control means and communication transmission means, a handle connected to and extending linearly from said functional unit and housing mechanical transfer means and having a switch means connected to said electronic control means and communication transmission means providing remote control and activation means between said wand and said computer control means, and a stylus connected to the proximal end of said handle and having an interface adapted to receive and transfer mechanical motion from said mechanical transfer means to said anastomosis appliance and applicator assemblies, said apparatus further comprising releasable brake means associated with all joints of said working arm, said brake means being operable in response to said switch means on said wand whereby release of said brake means allows complete movement of said arms and said wand through all degrees of freedom and activation of said brake means fixes said joints thereby holding said wand and said anastomosis appliance and applicator assemblies in a fixed position.

13. The surgical anastomosis apparatus of claim 12 wherein said two actuators comprise a linear actuator and a rotary actuator, said actuators being mechanically connected to said mechanical transmission assembly whereby mechanical motion generated by said actuators is conveyed to said transmission assembly, said transmission assembly being mechanically connected to said mechanical transfer means whereby rotary motion generated by said rotary

actuator is transferred by said transmission assembly and said mechanical transfer means to said interface and, thereby, to said anastomosis appliance and applicator assemblies.

14. The surgical anastomosis apparatus of claim 13 wherein said mechanical transfer means comprises a plurality of concentric tubular shafts independently axially rotatable within said handle and said stylus, said transmission assembly comprises a first set of gears corresponding to said shafts, each shaft having one gear of said first set fixedly attached to its distal end, said interface comprising a second set of gears corresponding to said shafts, each shaft having one gear of second set attached to its proximal end, whereby said first set of gears and said second set of gears each form a linear arrangement at each end of said shafts that is a mirror image of the other, said transmission assembly further comprising a pinion gear mounted on an axle rotatable by said rotary actuator and linearly translatable relative to said first set of gears by said linear actuator whereby said pinion gear is adapted to selectively engage and rotate each of said first set of gears and their corresponding shafts in accordance with a particular sequence dictated by the computer control means for a particular anastomosis appliance and applicator assembly.

15. The surgical anastomosis apparatus of claim 14 wherein said transmission assembly further comprises a snubber assembly cooperatively associated with said pinion gear which snubber assembly engages all of said first set of gears except the gear engaged by said pinion gear whereby only one shaft is capable of rotation at any one time during operation of said transmission assembly.

16. The surgical anastomosis apparatus of claim 15 wherein said anastomosis appliance and applicator assemblies each comprise a housing removably attachable to said stylus

and adapted to receive blood vessels for anastomosis, said housing having a transmission portion and an appliance applicator portion, wherein said transmission portion is adapted to receive said interface of said stylus and comprises a mechanical mechanism adapted to transmit rotary motion from said second set of gears to specific elements of said appliance applicator portion, and wherein said appliance applicator portion comprises a sequentially operable mechanism comprising inflatable means adapted to evert blood vessel openings whereby blood vessel intima is exposed, a plurality of gripping connectors adapted to engage and hold said everted blood vessel openings, and translation means adapted to bring said everted blood vessels into intima-to-intima contact and engage said gripping connectors whereby said anastomosis is performed in a substantially automated procedure.

17. An anastomosis apparatus comprising a manipulatable wand adapted to operate a self contained anastomosis appliance and applicator attached thereto, a wand positioning means adapted to provide gross and fine positioning of said wand and anastomosis appliance and applicator relative to blood vessels to be anastomosed, and computer control means adapted to sequentially actuate said anastomosis appliance and applicator in response to data input relative to the type of anastomosis to be performed, wherein said wand comprises a functional unit housing a power supply, an electronic control means and a mechanical actuator means, a transmission means, and an anastomosis appliance and applicator interface.

18. The anastomosis apparatus of claim 17 wherein said mechanical actuator means comprises a linear actuator and a rotary actuator operated by said power supply in response to signals generated by said electronic control means, said transmission means comprises a plurality of concentric shafts each independently axially rotatable by said rotary actuator operating through a first transmission mechanism capable of engaging only one shaft at a time, said

transmission mechanism being controlled by said linear actuator, said transmission means terminating in said interface comprising a second transmission mechanism adapted to transfer rotary motion of said shafts to said anastomosis appliance and applicator.

19. The anastomosis apparatus of claim 18 further comprising data input means whereby data relating to type of anastomosis to be performed, size of vessels, and type of anastomosis appliance and applicator to be used is entered into said computer control means whereby control signals relating to an operation sequence are generated by said electronic control means and said signals regulate the operation of said linear and rotary actuators, and communication means between said computer control means and said electronic control means.

20. The anastomosis apparatus of claim 19, wherein said first transmission mechanism comprises a plurality of equal diameter gears, each gear being secured to a first end of each shaft wherein each shaft from the outermost shaft inward is longer than the preceding shaft by an amount sufficient to permit the gear thereon to be engaged apart from the other gears, each gear being mounted on the end of its shaft and having an aperture therethrough corresponding to the inner diameter of said shaft whereby said successive concentric shafts are able to pass therethrough and freely rotate therein, whereby said gears form a linear array; said first transmission mechanism further comprising a pinion gear lateral to said linear gear array and adapted to individually engage said gears, said pinion gear being mounted on a shaft for rotation by said rotary actuator and for linear translation relative to said linear array by said linear actuator, whereby, in response to said electronic control means, said linear actuator causes said pinion gear to move into engagement with one of said linear array gears and said rotary actuator causes said pinion gear to rotate whereupon said engaged linear array gear and its shaft are rotated.

21. The anastomosis apparatus of claim 20 wherein said first transmission mechanism further comprises a snubber assembly associated with said pinion gear, said snubber assembly comprising a vane capable of engaging all of said linear array gears except the gear engaged by said pinion gear, said snubber assembly being linearly translatable concurrently with said pinion gear by said linear actuator, whereby said linear array gears not engaged by said pinion gear are prevented from rotating.

22. The anastomosis apparatus of claim 21, wherein said second transmission mechanism comprises a plurality of equal diameter gears identical to said equal diameter gears of said first transmission mechanism, each gear being secured to a second end of each shaft in a manner identical to said first transmission mechanism, whereby said second transmission mechanism comprises a mirror image of said linear array of gears in said first transmission mechanism, and wherein said second transmission mechanism is adapted to be received in and transmit rotational motion to said anastomosis appliance and applicator.

23. The anastomosis apparatus of claim 22 further comprising manual control means on said wand to activate and deactivate said electronic control means and said mechanical actuator means.

24. An anastomosis apparatus comprising a self contained anastomosis appliance and applicator, a manipulatable wand adapted to operate said self contained anastomosis appliance and applicator removably attachable thereto, a wand positioning means adapted to provide gross and fine positioning of said wand and anastomosis appliance and applicator relative to said vessels to be anastomosed, and computer control means adapted to sequentially actuate said anastomosis appliance and applicator in response to data input relative to the type of anastomosis

to be performed, wherein said wand comprises a power supply, mechanical actuator means, transmission means, and an anastomosis appliance and applicator interface adapted to engage said appliance and applicator and transfer mechanical motion from said mechanical actuator means, said interface comprising a plurality of gears, wherein said anastomosis appliance and applicator comprises a housing having a transmission portion and an appliance/applicator portion, said transmission portion adapted to receive said interface and comprising a plurality of gears engagable with said gears of said interface, said appliance/applicator portion being adapted to receive portions of blood vessels to be anastomosed and comprising a sequentially operable mechanism comprising inflatable means adapted to evert blood vessel openings whereby blood vessel intima is exposed, and anastomosis connecting means comprising a plurality of gripping connectors adapted to engage and hold said everted blood vessel openings, holders for said gripping connectors and translation means adapted to bring said everted blood vessels into intima-to-intima contact and engage said gripping connectors whereby said anastomosis is performed in a substantially automated procedure.

25. The anastomosis apparatus of claim 24 wherein said transmission portion further comprises shaft members attached to said gears and extending into said appliance applicator portion, said shaft members having means adapted to engage and drive said sequentially operable mechanisms in said appliance applicator portion in response to rotation of said gears by said interface.

26. The anastomosis apparatus of claim 25 wherein said inflatable means comprises first and second balloon structures removably positionable between blood vessels to be anastomosed, said balloon structures each comprising a balloon and holder assembly wherein said balloon is attached to and inflatable away from said holder to evert said blood vessels, said

inflatable means further comprising an inflation syringe fluidly connected to said balloons whereby said balloons are sequentially inflated and deflated, said balloon structures being removably positioned and said syringe being driven by said shaft members extending from said transmission portion.

27. The anastomosis apparatus of claim 26 wherein said first and second balloon structures are identical and are removably positionable between blood vessel ends to be anastomosed in a Type I anastomosis.

28. The anastomosis apparatus of claim 26 wherein said first and second balloon structures are different and are removably positionable between blood vessels being anastomosed in a Type III anastomosis.

29. The anastomosis apparatus of claim 26 wherein said anastomosis connecting means comprises first and second connector holder/ejector assemblies through which said blood vessels are inserted for anastomosis, said assemblies each comprising a substantially annular gripping connector holder, a cooperating substantially annular gripping connector ejector, a plurality of two part cooperating gripping connectors, said connectors of one part being held in said first holder and said connectors of the other part being held in said second holder, and a translation mechanism, wherein said connectors are adapted to grip and hold said everted blood vessels, said holder/ejector assemblies are adapted to translate laterally from a first spaced apart position following deflation of said balloons to a second position whereby said blood vessels are brought into contact with each other and said connectors are connected, and said ejectors are activated to eject said connectors from said holders whereby said anastomosis is completed and

held by said connectors and said holder/ejector assemblies are translated away from said anastomosis to a final position.

30. The anastomosis apparatus of claim 29 wherein said substantially annular holders and ejectors are separable in at least one location through their annular peripheries whereby said holder/ejector assemblies are removable from around said anastomosed blood vessels.

31. The anastomosis apparatus of claim 30 wherein said translation mechanism comprises a plurality of gear driven screw shafts operating through said holder/ejector assemblies and driven by said shafts extending from said transmission portion.

32. The anastomosis apparatus of claim 31 wherein each holder and ejector comprises a semicircular and two quarter-circular sections with each quarter-circular section being hinged to one end of said semicircular section, said appliance applicator portion of said housing having guide means therein cooperating with said holder/ejector assemblies whereby said quarter-circular sections are maintained in engagement with each other and with said semicircular section between said first position and said second position and wherein translation to said final position removes said holder/ejector assemblies from cooperation with said guide means whereby said quarter-circular sections are free to separate whereby said holders and ejectors are permitted to open thereby permitting removal of said apparatus from said blood vessels.

33. The anastomosis apparatus of claim 31 wherein each holder/ejector assembly comprises an inner ring and an outer ring, said inner ring being segmented at four places thereby forming two end segments and two side segments, whereby each segment is separately translatable toward said outer ring, said inner ring further comprises means to releasably hold said connectors, said outer ring having at least one end hinged so as to be openable upon

completion of an anastomosis and carrying ejector means whereby said connectors are ejected from said inner ring segments upon translation of said segments toward said outer ring, said outer ring further comprising translation means activated by said shafts extending from said transmission portion whereby said inner ring segments are translated.

34. The anastomosis apparatus of claim 33 wherein said first balloon structure further comprises a punch assembly having a punch blade and a cooperating anvil extending below said balloon, said anvil further comprising a strut whereby said anvil is extendable and retractable relative to said blade, said anvil being adapted for insertion into a blood vessel through an incision in a side wall thereof, whereby said anvil is retractable toward said blade thereby severing and trapping a portion of said blood vessel side wall and creating an arterio/venotomy for eversion by said balloon, said blade and anvil having a substantially oval shape.

35. The anastomosis apparatus of claim 34 wherein said first balloon structure further comprises means for extension and retraction of said structure through the opening formed by said inner ring.

36. The anastomosis apparatus of claim 24 wherein said gripping connectors comprise a body, at least one tine extending from said body so as to engage a blood vessel wall, and a connecting structure whereby two oppositely positioned gripping connectors are joined.

37. The anastomosis apparatus of claim 36 wherein said gripping connector body comprises a forward face portion having a curvature with a radius corresponding to the thickness of a blood vessel wall to be anastomosed, said at least one tine extends outward and upward from said face portion a distance of from 1/3 to 2/3 the thickness of said blood vessel wall, and said

connecting structure extends forward from the upper edge of said forward face portion over said at least one tine.

38. The anastomosis apparatus of claim 37 wherein said connecting structure on one of a pair of said gripping connectors comprises a male connector element and said connecting structure on the other of said pair of gripping connectors comprises a female connector element and each connector element comprises a cooperating detent means whereby said connectors are secured together when said connecting structures are joined.

39. The anastomosis apparatus of claim 37 wherein said connecting structure on one of a pair of said gripping connectors comprises an extension of said body extending forward of said curved face portion and having a locator pin thereon, and a clip member extending over said extension beyond said locator pin, said connecting structure on the other of said pair of gripping connectors comprises a hole in an upper portion of said forward face portion and a groove in a back surface of said body adapted to receive the end of said clip member.

40. The anastomosis apparatus of claim 37 wherein said connecting structure comprises mirror image pairs of interdigitating elongated extensions on each gripping connector, said extensions having cooperating detent means whereby said extensions interdigitate and are held together when cooperating pairs of gripping connectors are joined.

41. The anastomosis apparatus of claim 36 wherein said gripping connectors are adapted to connect blood vessels in a Type III anastomosis and consist of a first connector comprising an elongated body having a first end with said at least one tine extending outward and downward therefrom a distance of from $1/3$ to $2/3$ the thickness of a blood vessel wall, a lower face having a curvature with a radius corresponding to the thickness of said blood vessel

wall and a second end having a male connecting structure extending downward therefrom, and a second connector comprising a body having a curved face with a radius corresponding to the thickness of blood vessel, said at least one tine extending outward and upward from said curved face and a female connecting structure comprising an aperture extending downward through said body from an upper surface thereof, adapted to receive said male connecting structure, said male and female connecting structures having cooperating detent means, and whereby said first and second connectors fit together such that said tines assume a substantially 90° relationship.

42. A self contained anastomosis appliance and applicator comprising a housing having a transmission portion and an appliance applicator portion, said transmission portion containing a drive mechanism adapted to operate said appliance applicator and adapted to receive and connect to a remote power source, said appliance applicator portion having means to receive portions of blood vessels to be anastomosed and comprising a sequentially operable mechanism comprising inflatable means adapted to evert blood vessel openings whereby blood vessel intima is exposed, anastomosis connecting means comprising a plurality of opposed pairs of gripping connectors adapted to engage and hold said everted blood vessel openings, holders for said gripping connectors, translation means adapted to bring said everted blood vessels into intima-to-intima contact and engage said opposed pairs of gripping connectors whereby said opposed pairs of gripping connectors are joined in a secure manner and said blood vessels are held together whereby said anastomosis is performed.

43. The self contained anastomosis appliance and applicator of claim 42 wherein said inflatable means comprises first and second balloon structures removable positionable between said blood vessels to be anastomosed, said balloon structures each comprising an inflatable balloon and a balloon holder wherein said balloon is attached to and inflatable away from said

holder into said blood vessel, said balloon being adapted, when inflated, to engage a prepared edge of a wall of said blood vessel whereby said prepared edge is everted, said inflatable means further comprising an inflation syringe fluidly connected to said balloons and including means to sequentially and individually inflate and deflate said balloons, said balloon holders further comprising mechanical means whereby said first and second balloon structures are positioned between said blood vessels, said syringe is actuated to sequentially inflate and deflate said balloons, and said first and second balloon structures are withdrawn from between said blood vessels wherein said mechanical means is driven by said drive mechanism in said transmission portion.

44. The self contained anastomosis appliance and applicator of claim 43 wherein said anastomosis connecting means comprises first and second connector holder/ejector assemblies through which said blood vessels are inserted for anastomosis, said assemblies each comprising a substantially annular gripping connector holder, a cooperating substantially annular gripping connector ejector, a plurality of said opposed pairs of gripping connectors, one of each pair of said connectors being held in said first holder and the other of each pair of said connectors being held in said second holder, and a translation mechanism, wherein said connectors are adapted to grip and hold said everted blood vessels following withdrawal of said first and second balloon structures, said holder/ejector assemblies are adapted to translate laterally from a first spaced apart position to a second position whereby said blood vessels are brought into contact with each other and said pairs of said connectors are connected, and said ejectors are activated to eject said connectors from said holders whereby said anastomosis is completed and held by said connectors and said holder/ejector assemblies are translated away from said anastomosis to a final position.

45. The self contained anastomosis appliance and applicator of claim 44 wherein said substantially annular holders and ejectors are separable in at least one location through their annular peripheries whereby said holder/ejector assemblies are removable from around said anastomosed blood vessels.

46. The self contained anastomosis appliance and applicator of claim 45 wherein said translation mechanism comprises a plurality of gear driven screw shafts operating through said holder/ejector assemblies and driven by said drive mechanism in said transmission portion.

47. The self contained anastomosis appliance and applicator of claim 46 wherein each holder and ejector comprises a semicircular and two quarter-circular sections with each quarter-circular section being hinged to one end of said semicircular section, said appliance applicator portion of said housing having guide means therein cooperating with said holder/ejector assemblies whereby said quarter-circular sections are maintained in engagement with each other and with said semicircular section between said first position and said second position and wherein translation to said final position removes said holder/ejector assemblies from cooperation with said guide means whereby said quarter-circular sections are free to separate whereby said holders and ejectors are permitted to open thereby permitting removal of said apparatus from said blood vessels.

48. The self contained anastomosis appliance and applicator of claim 46 wherein each holder/ejector assembly comprises an inner ring and an outer ring, said inner ring being segmented at four places thereby forming two end segments and two side segments, whereby each segment is separately translatable toward said outer ring, said inner ring further comprises means to releasably hold said connectors, said outer ring having at least one end hinged so as to

be openable upon completion of an anastomosis and carrying ejector means whereby said connectors are ejected from said inner ring segments upon translation of said segments toward said outer ring, said outer ring further comprising translation means activated by said drive mechanism in said transmission portion whereby said inner ring segments are translated.

49. The self contained anastomosis appliance and applicator of claim 48 wherein said first balloon structure further comprises a punch assembly having a punch blade and a cooperating anvil extending below said balloon, said anvil further comprising a strut whereby said anvil is extendable and retractable relative to said blade, said anvil being adapted for insertion into a blood vessel through an incision in a side wall thereof, whereby said anvil is retractable toward said blade thereby severing and trapping a portion of said blood vessel side wall and creating an arterio/venotomy for eversion by said balloon, said blade and anvil having a substantially oval shape.

50. The self contained anastomosis appliance and applicator of claim 49 wherein said first balloon structure further comprises means for extension and retraction of said structure through the opening formed by said inner ring.

51. The anastomosis apparatus of claim 46 wherein said gripping connectors comprise a body, at least one tine extending from said body so as to engage a blood vessel wall, and a connecting structure whereby two oppositely positioned gripping connectors are joined.

52. The anastomosis apparatus of claim 51 wherein said gripping connector body comprises a forward face portion having a curvature with a radius corresponding to the thickness of a blood vessel wall to be anastomosed, said at least one tine extends outward and upward from said face portion a distance of from $1/3$ to $2/3$ the thickness of said blood vessel wall, and said

connecting structure extends forward from the upper edge of said forward face portion over said at least one tine.

53. The anastomosis apparatus of claim 52 wherein said connecting structure on one of a pair of said gripping connectors comprises a male connector element and said connecting structure on the other of said pair of gripping connectors comprises a female connector element and each connector element comprises a cooperating detent means whereby said connectors are secured together when said connecting structures are joined.

54. The anastomosis apparatus of claim 52 wherein said connecting structure on one of a pair of said gripping connectors comprises an extension of said body extending forward of said curved face portion and having a locator pin thereon, and a clip member extending over said extension beyond said locator pin, said connecting structure on the other of said pair of gripping connectors comprises a hole in an upper portion of said forward face portion and a groove in a back surface of said body adapted to receive the end of said clip member.

55. The anastomosis apparatus of claim 52 wherein said connecting structure comprises mirror image pairs of interdigitating elongated extensions on each gripping connector, said extensions having cooperating detent means whereby said extensions interdigitate and are held together when cooperating pairs of gripping connectors are joined.

56. The anastomosis apparatus of claim 51 wherein said gripping connectors are adapted to connect blood vessels in a Type III anastomosis and consist of a first connector comprising an elongated body having a first end with said at least one tine extending outward and downward therefrom a distance of from $1/3$ to $2/3$ the thickness of a blood vessel wall, a lower face having a curvature with a radius corresponding to the thickness of said blood vessel

wall and a second end having a male connecting structure extending downward therefrom, and a second connector comprising a body having a curved face with a radius corresponding to the thickness of blood vessel, said at least one tine extending outward and upward from said curved face and a female connecting structure comprising an aperture extending downward through said body from an upper surface thereof, adapted to receive said male connecting structure, said male and female connecting structures having cooperating detent means, and whereby said first and second connectors fit together such that said tines assume a substantially 90° relationship.

57. An anastomosis apparatus comprising a manipulatable wand adapted to operate a self contained anastomosis appliance and applicator attached thereto, a wand positioning means adapted to provide gross and fine positioning of said wand and anastomosis appliance and applicator relative to blood vessels to be anastomosed, and computer control means adapted to sequentially actuate said anastomosis appliance and applicator in response to data input relative to the type of anastomosis to be performed, wherein said wand comprises a functional unit housing a power supply, an electronic control means, an anastomosis appliance and applicator interface and at least one anastomosis appliance and applicator engagable with said interface.

58. The anastomosis apparatus of claim 57, wherein said anastomosis appliance and applicator comprises a housing having a transmission portion and an appliance applicator portion, said transmission portion adapted to receive said interface and said appliance applicator portion adapted to receive portions of blood vessels to be anastomosed and comprising a sequentially operable mechanism comprising inflatable means adapted to evert blood vessel openings whereby blood vessel intima is exposed, and anastomosis connecting means comprising a plurality of gripping connectors adapted to engage and hold said everted blood vessel openings, holders for said gripping connectors and translation means adapted to bring said

everted blood vessels into intima-to-intima contact and engage said gripping connectors whereby said anastomosis is performed in a substantially automated procedure.

59. The anastomosis apparatus of claim 58 wherein said transmission portion further comprises a drive means and a transmission means, said transmission means comprising a plurality of shaft members extending into said appliance applicator portion, each of said shaft members having a first end in said transmission portion having a gear adapted for sequential engagement by said drive means and a second end in said appliance applicator portion having means adapted to engage and drive said sequentially operable mechanisms in said appliance applicator portion in response to rotation of said shafts said drive means.

60. The anastomosis apparatus of claim 59 wherein said drive means comprises a linear actuator and a rotary actuator operating in response to said electronic control means, whereby said linear actuator operates to sequentially engage said rotary actuator with said gears on said first ends of said shaft members.